

What is claimed:

1. A mitral valve therapy device configured to be placed in the coronary sinus of a heart adjacent to the mitral valve annulus, the device comprising a force applier that applies an applied force to a discrete portion of the atrial wall of the coronary sinus adjacent to the mitral valve annulus to concentrate the applied force on a discrete portion of the mitral valve annulus.

2. The device of claim 1 wherein the coronary sinus has an unstressed cross-sectional dimension and wherein the force applier has a cross-sectional dimension greater than the unstressed cross-sectional dimension of the coronary sinus to change the shape of the mitral valve annulus.

3. The device of claim 1 wherein the mitral valve annulus has a circumference, wherein the coronary sinus has a cross sectional diameter, and wherein the force applier has an axial length substantially less than half the circumference of the mitral valve annulus and a deployed transverse dimension greater than the diameter of the coronary sinus.

4. The device of claim 3 wherein the device comprises an expandable structure that expands from a collapsed condition to an expanded condition defining the deployed transverse dimension.

5. The device of claim 4 wherein the expandable structure is self-expandable.

6. The device of claim 4 wherein the expandable structure is mechanically expandable.

7. The device of claim 6 wherein the expandable structure  
5 is pull wire expandable.

8. The device of claim 4 wherein the device is cylindrical in configuration.

10 9. The device of claim 1 wherein the force applier applies the applied force to a plurality of discrete portions of the atrial wall of the coronary sinus.

10. The device of claim 8 wherein the device is a frame  
15 structure.

11. The device of claim 10 wherein the frame structure is balloon expandable.

20 12. The device of claim 1 further including a force distributor that distributes the applied force along a pericardial wall of the coronary sinus.

13. The device of claim 12 wherein the force applier  
25 applies the applied force to a plurality of discrete portions of the atrial wall of the coronary sinus.

14. The device of claim 12 wherein the force distributor has a surface area, wherein the force applier has a surface area  
30 defining the discrete portion, and wherein the surface area of

the force distributor is greater than the surface area of the force applier.

15        15. The device of claim 1 wherein the force applier is a balloon.

16. A mitral valve therapy device configured to be placed in the coronary sinus of a heart adjacent to the mitral valve annulus, the device comprising:

10                a force distributor that distributes an applied force along a pericardial wall of the coronary sinus;

              a force applier that applies the applied force to at least one discrete portion of a wall of the coronary sinus adjacent to the mitral valve annulus to concentrate the applied force on at least one discrete portion of the mitral valve annulus.

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17. The device of claim 16 wherein the mitral valve annulus has a circumference and wherein the force applier has a length substantially less than one half the mitral valve annulus circumference.

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18. The device of claim 16 wherein the force applier applies the applied force to a plurality of discrete portions of the wall of the coronary sinus adjacent to the mitral valve annulus.

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19. The device of claim 16 wherein the force distributor comprises an elongated first member configured to substantially continuously contact the pericardial wall of the coronary sinus and wherein the force applier comprises a second member

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extending from the first member at an angle, the second member having an end that applies the applied force.

20. The device of claim 19 wherein the second member is  
5 resiliently connected to the first member.

21. The device of claim 19 wherein the first and second members are integrally formed from a same elongated member.

10 22. The device of claim 21 wherein the same elongated member is formed from a resilient material.

23. The device of claim 19 wherein the first member has opposed ends and wherein the second member extends from the  
15 first member intermediate the opposed ends of the first member.

24. The device of claim 23 wherein the force applier further includes at least one additional member extending from the first member intermediate the opposed ends of the first  
20 member.

25. The device of claim 24 wherein the at least one additional member extends from the first member substantially parallel to the second member.

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26. The device of claim 24 wherein the first and second members form an integral structure.

27. The device of claim 16 wherein the force distributor  
30 is an elongated frame structure and wherein the force applier

comprises at least one columnar frame structure extending from the elongated frame structure.

28. The device of claim 27 wherein the at least one  
5 columnar frame structure is expandable from a collapsed condition to an expanded columnar condition.

29. The device of claim 28 wherein the at least one  
10 columnar frame structure is self-expandable.

30. The device of claim 28 wherein the at least one  
columnar frame structure is balloon expandable.

31. The device of claim 27 wherein the elongated frame  
15 structure is expandable from a collapsed condition to an expanded condition.

32. The device of claim 31 wherein the elongated frame  
20 structure is self-expandable.

33. The device of claim 31 wherein the elongated frame  
structure is balloon expandable.

34. The device of claim 27 wherein the force applier  
25 comprises a plurality of columnar frame structures.

35. The device of claim 24 wherein the plurality of  
columnar frame structures are expandable from a collapsed  
condition to an expanded columnar condition.

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36. The device of claim 35 wherein the plurality of columnar frame structures are self-expandable.

37. The device of claim 35 wherein the plurality of  
5 columnar frame structures are balloon expandable.

38. The device of claim 16 wherein the device is an elongated frame structure, the elongated frame structure having a portion of increased transverse dimension to form the force  
10 applicer.

39. The device of claim 38 wherein the elongated frame structure is expandable in transverse dimension.

15 40. The device of claim 39 wherein the elongated frame structure is self-expandable.

41. The device of claim 39 wherein the elongated frame structure is balloon expandable.

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42. The device of claim 16 wherein the device is an elongated member having outwardly curved end portions that engage the pericardial wall of the coronary sinus to form the force distributor and an inwardly curved portion between the  
25 outwardly curved end portions to form the force applicer.

43. A method of treating dilated cardiomyopathy of a heart including the step of applying a force to a discrete localized portion of an atrial wall of a coronary sinus to concentrate the  
30 force on a corresponding localized portion of a mitral valve annulus to change the shape of the mitral valve annulus.

44. The method of claim 43 wherein the applying step includes inflating a balloon within the coronary sinus.

5        45. The method of claim 43 wherein the applying step includes the step of implanting a force applying device in the coronary sinus, the device applying the force to the discrete localized portion of the coronary sinus.

10       46. The method of claim 45 wherein the device is expandable from a collapsed condition to a deployed condition, wherein the implanting step is carried out while the device is in the collapsed condition, and wherein the applying step further includes the step of expanding the device to the  
15       deployed condition after the device is implanted.

47. The method of claim 46 wherein the expanding step includes expanding the device with a balloon.

20       48. The method of claim 46 wherein the expanding step includes mechanically expanding the device.

49. The method of claim 43 including the further step of distributing the applied force along a pericardial wall of the  
25       coronary sinus.

50. The method of claim 49 wherein the applying step includes the step of applying the force to a plurality of discrete localized portions of the atrial wall of the coronary  
30       sinus while distributing the applied force along the pericardial wall of the coronary sinus.

51. The method of claim 50 wherein the applying step includes the step of implanting a force applying device in the coronary sinus, the device applying the force to the plurality  
5 of discrete localized portions of the coronary sinus.

52. The method of claim 51 wherein the device is expandable from a collapsed condition to a deployed condition, wherein the implanting step is carried out while the device is  
10 in the collapsed condition, and wherein the applying step further includes the step of expanding the device to the deployed condition after the device is implanted.

53. The method of claim 52 wherein the expanding step  
15 includes expanding the device with a balloon.

54. The method of claim 52 wherein the expanding step includes mechanically expanding the device.

20 55. A mitral valve therapy device configured to be placed in the coronary sinus of a heart adjacent to the mitral valve annulus, the device comprising force applying means for applying an applied force to a discrete portion of the atrial wall of the coronary sinus adjacent to the mitral valve annulus for  
25 concentrating the applied force on a discrete portion of the mitral valve annulus.

56. The device of claim 55 wherein the force applying means is a balloon.  
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57. The device of claim 55 wherein the coronary sinus has an unstressed cross-sectional dimension and wherein the force applying means has a cross-sectional dimension greater than the unstressed cross-sectional dimension of the coronary sinus for  
5 changing the shape of the mitral valve annulus.

58. The device of claim 55 wherein the mitral valve annulus has a circumference, wherein the coronary sinus has a cross sectional diameter, and wherein the force applying means  
10 has an axial length substantially less than half the circumference of the mitral valve annulus and a deployed transverse dimension greater than the diameter of the coronary sinus.

59. The device of claim 55 wherein the device comprises expandable structure means for expanding from a collapsed condition to an expanded deployed condition.  
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60. The device of claim 59 wherein the expandable  
20 structure means is mechanically expandable.

61. The device of claim 59 wherein the expandable structure means is balloon expandable.

62. The device of claim 55 further including force  
25 distributing means for distributing the applied force along a pericardial wall of the coronary sinus.

63. The device of claim 62 wherein the force distributing  
30 means has a surface area, wherein the force applying means has a surface area defining the at least one discrete portion, and

wherein the surface area of the force distributing means is greater than the surface area of the force applying means.

64. The device of claim 55 wherein the force applying  
5 means includes means for applying the applied force to a plurality of discrete portions of the atrial wall of the coronary sinus.

65. A mitral valve therapy device configured to be placed  
10 in the coronary sinus of a heart adjacent to the mitral valve annulus, the device comprising:

force distributing means for distributing an applied force along a pericardial wall of the coronary sinus; and

force applying means for applying the applied force to  
15 at least one discrete portion of a wall of the coronary sinus adjacent to the mitral valve annulus to concentrate the applied force on at least one discrete portion of the mitral valve annulus.